

as a conveyancer. The natural bent of his mind, and some association of his relatives with the Society of Arts, led him to join it, and he soon became a member of its council. The Society was then in anything but a flourishing state. The necessity for such work as it had usefully done at the beginning of the century had passed away, and those who then controlled its destinies were hardly capable of striking out for it a fresh line of action. It was, however, just beginning to revive a little, when the proposal to hold the first great exhibition was taken up by Mr. (now Sir) Henry Cole, Mr. (afterwards Sir) Wentworth Dilke, and some others of the more enterprising spirits who were then gaining the upper hand in the Society. With this reforming party Mr. Foster was associated, and it tells much of the character of the man, of his freedom from self-seeking tendencies, that while other members of the little body worked their way upwards to honours and high positions, he was content to remain without reward, either pecuniary or titular, as a worker for the whole of his life. When Mr. Grove gave up the secretaryship of the Society of Arts in 1853, Mr. Foster, resigning the post he then held on its Council, was appointed to the office, an office which he held till the day of his death, last Thursday. Since then his career has been associated with that of the Society. This grew in numbers and influence, and so the Secretary's office increased in importance. During the twenty-five years in which he guided it, it did a great deal of good work, and, it may be owned, some which was not of much value. The trivialities soon passed away and were forgotten, the good work endures. In undertakings such as that of a public society most of the work and but little of the credit falls to the executive officer, and probably, if the truth were known, many of the crude ideas first launched into the world at the Society of Arts owed their ultimate success to their having been hammered into a practical form by the secretary. Ever ready with advice, the fruit of long experience, never bored even by the most importunate of inventors, ready to find something good, something to praise in the most impracticable of schemes, he won the friendship, even the affection, of all who knew him.

At many scientific gatherings his genial presence will be missed. His was a well-known figure at the British Association meetings. For thirteen years he acted as secretary to Section G (Mechanical Science), and from 1863 to 1866 he served on the Council of the Association. Taking an intelligent interest in several branches of science, it was to photography that he principally devoted himself. He was one of the earliest amateur photographers, and continued to work energetically at his favourite pursuit down to the time of his death. One of his last bits of out-door work, before his camera was laid aside for the winter, was to take a view of the Obelisk on the Embankment, a day or two before it was swung from a horizontal into a vertical position. He wrote a good deal on photographic subjects, mainly in the pages of the *British Photographic Journal*, and similar periodicals. He also wrote the article on photography in the series of volumes on "British Industries," published by Mr. Stanford. He was an occasional contributor to several of the scientific and technical journals, and wrote a good deal in the *Journal* of his own society, which, though not founded by him, was published from the beginning under his auspices, for he was on the Committee of Publications when it began, and his secretaryship commenced before the completion of its first volume. The older series of *Transactions*, it will be remembered, ceased some few years before the *Journal* was started. Mr. Foster was one of the founders of the Photographic Society, and served till a few years ago on its council. He was also President of the Queckett Club for a year. The manner of his death was startlingly sudden. Returning home after his day's work, he sat down to read the newspaper before dinner, when one of his family coming into the room

after he had been by himself only a few minutes, found that he had fallen back from his chair dead. The cause of death was fatty degeneration of the heart. He died as we might all wish to die, at a ripe old age (nearly seventy), quietly and easily, after a good life's work, and in harness till the end.

He did not live to receive a testimonial which his friends had just collected for him, and these same friends now propose to do what they can to increase the amount for the benefit of those he has left behind.

DR. APPLETON

WE were only able last week to note briefly the loss which learning and science have sustained in the death of Dr. Appleton at the early age of thirty-eight years. Dr. Appleton was born at Reading, where, and at St. John's, Oxford, he received his education. His special bent lay more in a literary and philosophical than in a scientific direction; but, as we indicated, his services to the advancement of science in this country have been very great. He may, indeed, be regarded as the originator of the movement for the endowment of scientific research; and it is greatly owing to his unceasing activity and influence that anything has been done in this direction by Government. To quote the words of the memoir in the *Academy*, of which he was the founder, and which, for the sake of sound criticism and accurate knowledge, we trust will be a lasting monument to his energy, and the breadth of his culture:—"With an enthusiasm which nothing could chill, and a belief no opposition could shake, he endeavoured to inspire his countrymen with the same zeal for learning and science that he felt himself, and to rekindle among them the well-nigh extinguished love of disinterested study and research. Where others talked, he acted; where others wavered, he continued firm. Through good report and evil report he struggled on towards the goal he saw clearly before him, and the confidence he felt himself was communicated to those who worked with him. Gifted with the power of organisation, with boundless energy, and with the art of influencing others, he was marked out as the leader of a forlorn hope. Defeat was impossible for him, and disappointment only increased his courage and activity. It was in Dr. Appleton's hands that the movement in favour of the endowment of research took solid shape and organisation. His exertions brought about the meeting at the Freemasons' Tavern in 1872, which first drew public attention to the fact that the universities exist for something higher than the examination of young men. From that time forward Dr. Appleton took an active share in the agitation that resulted in the passing of the Universities Act of 1877, and none of the opportunities which his editorial position gave him were allowed to be lost. Besides letters in the *Times*, the *Pall Mall Gazette*, and elsewhere, he wrote two elaborate articles on 'The Economic Character of Subsidies to Education' and 'The Endowment of Research as a Form of Productive Expenditure,' both republished in the volume of 'Essays on the Endowment of Research,' of which Dr. Appleton was editor."

We are pleased also to be able to refer in this connection to an article in the *Athenaeum*. Although there are some parts of this article which we certainly could not quote. In this it is acknowledged that Dr. Appleton had raised a great question, and given it a hold on public interest, "and there can be no doubt that the movement which he, more than any other single man, had set on foot had considerable effect on several of the provisions of the Universities Act passed by the present Government." . . . "For a man who died before he was thirty-eight it is no slight achievement to have forced such a question as this on the sluggish attention both of the public and of Parliament."

We are pleased not only that our contemporary should bear such hearty testimony to the energy and success of Dr. Appleton, in promoting the cause which he had at heart, but that it should be able to refer to the subject of endowment of research not only without bitterness, but with even some slight measure of approval. A cause which had so pure-minded, clear-sighted, and widely-cultured a man as Dr. Appleton on its side, must surely have some solid reasons in its favour.

Dr. Appleton is acknowledged by all who knew him to have been one of the most even-tempered of men. He was always cheerful and complaisant; opposition and even rudeness did not ruffle him; he returned to the charge smiling at every blow. He was a very quick and ready manager in such work as that of an editor, being full of suggestion, and prompt at meeting difficulties. He was a genuine philosopher, though he professed keen interest in all departments of knowledge, he did not make the mistake of over-estimating his own knowledge, or of pretending to an encyclopaedic mind. His great merit is that he really gave time and strength for "ideal" ends.

PRISON BREAD

IN two former papers¹ I discussed the dietetic value and chemical composition of brown bread and of aerated bread. The recent report² of the Committee appointed to inquire into the dietaries of the prisons in England and Wales having called public attention to the subject of the nourishment contained in different varieties of bread, the suggestions made in that report may be suitably considered at the present time.

On pages 21, 22, 23, 38, and 39 of the report will be found the statements and figures as to the bread question, which I propose to criticise on the present occasion. The committee begin by stating that "the flesh-formers in white bread amount to 7 or 8 per cent., according to the quality of the wheat of which it is made. In bread containing the envelopes (of the grain) they amount to about 10 per cent." Two or three years ago little fault could have been found with these statements; indeed, the Committee appear here as in other parts of their report, to have drawn some of their facts and figures from a work of my own on Food, published in 1876 for the Science and Art Department. Still I am not now prepared, in the light of the most recent analyses of wheat and its mill-products, to endorse the statement that brown bread, whether made so as to include all the flour, middlings, sharps, pollard, and bran, produced from a given weight of wheat, or with all these materials minus the coarse bran, will contain on the average 10 per cent. of flesh-formers. Why, there are some varieties of wheat, beautiful, plump, soft, white, floury wheats, which do not contain more than 8 per cent. of total nitrogenous matters of all kinds, including veritable flesh-formers. How then can a wheat of this kind, if simply ground up (whether the 4 per cent. of long bran it yields be included in or excluded from the bread), be made to yield a brown bread or whole meal bread containing more flesh-forming matter than 5½ per cent.? For the meal will have taken up nearly one half its own weight of additional water, and will now be proportionately more dilute as to all its nutrients.

And, again, I have previously pointed out that the coverings of the wheat grain contain, in varying, yet considerable proportions, nitrogenous compounds to which the flesh-forming property cannot be rightly attributed. Thus, it may easily happen that the inclusion of the 14 or 15 per cent. of mill products, usually rejected in bread-making (excluding the long bran), may not appreciably influence the proportion of flesh-formers in the loaf. These two considerations do not, in my opinion, lessen the desirability of substituting whole meal

¹ NATURE, vol. xviii. p. 229, and vol. xix. p. 174.

² Report of Committee on Dietaries in Prisons, 1878.

bread for white bread in our prisons, but they invalidate some of the Committee's calculations as to the amounts of flesh-formers supplied in the new prison-dietaries, and they further suggest a method of adjusting the nutrient ratio which should subsist between the nitrogenous and carbonaceous constituents of the day's ration. I will briefly discuss these two points.

We are told (on page 38) that 7 lbs. per week of bread will furnish the prisoner with 9·072 ounces of flesh-formers. Now, if the bread referred to be that recommended by the reporters, 7 lbs. should furnish, according to their own showing, no less than 11·2 ounces of flesh-forming nitrogenous matters. For they affirm such bread to contain on the average 10 per cent. of flesh-formers, and so the weekly allowance of 7 lbs. or 112 ounces of bread would furnish 11·2 ounces of these nutrients. They appear, however, to have assumed the bread in use to contain not 10, but only 8·1 per cent. of flesh-formers—at least, in the absence of direct analytical data, I deduce this figure from the calculated amounts of nitrogenous substance tabulated in the report. Indeed, I conclude that they have not made the fresh calculations rendered necessary by the altered composition of the proposed bread, but have adopted the old figures of Playfair and other writers on this subject. But taking average whole meal bread made as directed by the reporters, and from ordinary wheats, it would not be safe to reckon upon it containing as much as 8·1 per cent. of true flesh-forming material—my own experiments put it at a little above 7. But granted the higher figure, we then find that the prisoners with hard labour (with 7 days' confinement) receive no more than 14 ounces of flesh-formers to 96 of heat givers, reckoned as starch, during a week. The ratio here is 1 to 6·8, which differs too widely from the normal ratio (1 : 4½) to afford satisfactory sustenance to men expected to do hard work.

There are, however, two ways out of this difficulty. Why should not a part of the fine flour be excluded from the constituents of the meal for prison bread? Or again, why should not biscuit flour, tailings, and middlings be added to it from other sources? And the same result might be ensured, and the flesh-formers be at the same time more adequately represented in the bread, if care were taken to choose for prison meal the hard, horny and tail wheats, which are always more nitrogenous than the white, opaque and soft grains. It is true that some of these hard, translucent wheats, especially when they owe their character to unripeness or a wet season, contain a larger proportion than usual of non-albuminoid nitrogen, but in spite of this their percentage of true flesh-formers is always high. It would be quite easy, by chemical analysis of the samples of grain offered by contract to the authorities, always to secure a wheat containing 13 to 14 per cent. of true flesh-formers, and therefore capable of producing a bread with at least 9 per cent.

There are two other remarks suggested by reading the part of this report on Prison Dietaries which relates to bread. The Committee is clearly right when it urges the desirability of including most of the coarser mill products of wheat in the meal on account of the phosphates thus secured. And the proposed plan is a good one, of making the dough of the finer mill products only at first, and then introducing, when the dough is nearly ready for the oven, the middlings, sharps, and pollard; again, kneading the mass as quickly as possible, and then baking it. The excessive solidity and stickiness of most whole meal bread is thus avoided, since the ferment present in the seed coats of the grain have but little time to exert their action upon the starch of the flour. A. H. CHURCH

ISOMORPHISM

AT the regular meeting of the Berlin Chemical Society on February 10, Prof. Hermann Kopp, of Heidelberg, delivered an address upon "Isomorphism." Prof.